

# **Power Relationships along the Value Chain: Multinational Firms, Global Buyers, and Local Suppliers' Performance**

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## **Abstract**

There is a growing literature exploring the increasing fragmentation of production processes and the evolution of internationally-dispersed but functionally-integrated economic activities. However, most of this literature appears to neglect an important part of the story, that is the form and the organization of the relationships (the governance) among the various actors involved in these activities, and their implications for development. We develop this analysis in this paper, and explore it empirically with a new dataset on Thailand.

In order to address this issue, we study global and domestic value chains in Thailand, and develop a quantitative measure of their governance, which takes into account different levels and types of buyers' involvement with suppliers' activities. We then use this measure to explore econometrically its relationship with suppliers' performance.

An important finding is that the relationships MNCs have with their suppliers is multifold and generally more intense than for domestic value chains. Our estimates suggest that more intense buyers' involvement with local suppliers, not only in the definition of products' characteristics, design and quality, but also in technology dissemination and R&D is generally associated with higher suppliers' productivity. However, the governance of the value chain appears to affect the productivity of domestic value chains' suppliers to a greater extent than for firms supplying MNCs or for exporters. We suggest that this result may be explained by the different nature of the information and knowledge being exchanged, and by the gaps between the leader and its suppliers.

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## 1 Introduction <sup>1</sup>

The increasing globalization of the world economy has changed the economic setting faced by industries and individual firms in developing countries, as it has in the industrialized world. One important feature has been the increasing fragmentation of production processes and the evolution of internationally-dispersed but functionally-integrated economic activities. Remarkable trade integration and cross-border investments have been the result of these transformations, and their consequences have been widely studied.

In particular, the international economics literature has had a lasting interest on the static and dynamic effects of this newly emerging paradigm and on the different forms that the international involvement of countries, industries and firms is taking. The term “international involvement” was first used by Lall (1980) with reference to the choice of US Transnational Corporations (TNCs) between exports and Foreign Direct Investments (FDI). The same notion was extended by others (Oman, 1984, Markusen, 1995), and now comprises a wider set of strategies that firms can jointly or individually use to serve foreign markets and/or gain access to assets available abroad, including licensing and other agreements with foreign partners, the creation of networks of sales agents, and the setting up of commercialisation affiliates abroad (Helpman et al., 2004, Castellani and Zanfei, 2006). However, many branches of the current literature, appear to neglect an important part of the story, that is the form and the organization of the relationships among the various actors involved in these channels, and their implications for development. We develop this analysis in this paper, and explore it empirically on Thailand.

Following this frame of mind, the forms and the patterns of coordination and the level of hierarchy in such relationships may indeed matter for growth and learning processes, especially in developing countries. This may influence the benefits and costs of developing countries’ integration in global markets, as *“...it is not only a matter of whether to participate into the global economy, but how to do so in a way which provides sustainable growth, especially for poor people and poor countries. ... in recent years, we observed many countries and regions suffering from declining income shares while having experienced a growth of their participation in global trade”* (Kaplinski 2000)

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The relevance of coordination or governance of the relationships in international production and trade has been highlighted by the recent Global Value Chains (GVC) literature, which suggests that the governance and the actors of Global Value Chains importantly affect the generation, transfer and diffusion of knowledge (Humphrey and Schmitz, 2000). The GVC literature has tackled these issues mostly referring to developing countries, and debating on the opportunities and threats that GVCs may represent for LDCs. Thus, for example, a more critical view has argued that by adopting hierarchical forms of coordination, Global Buyers may operate to confine competencies of developing countries' manufacturers to the simply assembly of imported material, making them potentially very vulnerable and subject to increasing competition and falling returns (Schmitz 2000).

Drawing from some fundamental insight of the GVC literature, in this paper we attempt to investigate the patterns of governance arising in value chains led by Global Buyers and their impact on suppliers' performance with specific reference to the Thai manufacturing industry. We integrate and build on the existing literature in three ways.

First, we look at the case of whether the Global Buyer is represented by a Multinational Company (MNC). The GVC literature has the merit to include the governance of the relationships and the role played by Global Buyers into the study of the static and dynamic effects of openness. In spite of these merits, one of the major weaknesses of this literature is that the role of Global Buyers' characteristics has been little explored beyond Gereffi's (1994) categorization of "buyer-driven" and "producer-driven" commodity chains', with their respective forms of governance. Our line of argument instead is that heterogeneity in Global Buyers may significantly affect the way cross-border relationships are governed, the extent of the transmission of knowledge, and the ensuing learning promoted in developing countries' firms. More specifically, we distinguish between Multinational Companies and other chain leaders, MNCs are increasingly operating as global buyers, with their role not yet confined to production but progressively extending to planning and management of global networks of suppliers and firms. Moreover, the literature has traditionally considered MNCs as possessing some technological lead and exploiting this proprietary advantage in international markets (Dunning, 1993), and thereby potentially creating opportunities for knowledge diffusion and learning for their local suppliers (Turok, 1993; Albio et al., 1999; Hewitt-Dundas et al. 2002).

A second original contribution of this study is to define a quantitative measure of the Value Chains' governance. To the best of our knowledge, the most part of existing analyses are based on case studies and surveys, thus merely offering descriptive

statistics and observations. Instead, we develop a measure and carry out econometric tests on this basis.

Finally, we attempt a comparison between global and domestic value chains, and then between global value chains led by MNCs and those led by other global actors, in terms of governance patterns and the effects on suppliers' performance and learning. We expect different forms of governance, more or less binding and severe for local suppliers in terms of products specification and standards' enforcement, with the parameters set by the MNC more complex, requiring greater assistance and possibly creating opportunities for improving performances. At the same time, however, we are aware of "cherry picking" followed by MNCs when they carefully select their suppliers: local suppliers would be performing better ex-ante and not as a result of the assistance offered by the chain leader.

For similar reasons the intensity and the extent of Buyers' influence on suppliers' performance is likely to vary between firms which are part of multinational' s network and firms in value chains led by national buyers. We expect domestic firms, ex-ante less efficient than domestic firms working for MNCs, to heavily depend on the way the buyer assists them in improving products' features and production processes. In other words, efficiency improvements are expected to be powerfully linked to the governance of the value chain.

Section 2 overviews the theoretical background of the Global Value Chains approach. Section 3 illustrates the data we use and our value chain governance measure, and section 4 discusses the results of our empirical exercises. Section 5 concludes.

## **2 The Global Value Chains approach**

The concept of value chain describes the full range of activities that are required to bring a product from its conception, through the different phases of production, to its end use and beyond. This includes activities such as design, production, marketing, distribution and support to the final consumer.

The "Global Value Chain approach" focuses on the activities and the strategic role of the relationships with other firms and actors. Drawing from the transaction cost literature, Gereffi (1990) developed a framework that ties the concept of the value-added chain directly to the global organization of industries. Later, he introduced the notion of "*governance*" of the Value Chains, defined as "authority and power relationships that determine how financial, material, and human resources are allocated and flow within a chain" (Gereffi, 1994). This concept is now central in the

literature. By focusing explicitly on the governance of disintegrated chains, and contrasting them to the relationships within vertically integrated chains, the global commodity chains framework draws attention to the role of networks in driving the co evolution of cross-border forms of industrial organization.<sup>2</sup>

The literature highlights two critical parameters of the value chain governance: what is to be produced, and how it is to be produced. In each case, the level of detail at which the parameters are specified can vary. When the buyer plays this role, we refer to it as the "lead firm" in the chain. (Sturgeon 2002).<sup>3</sup>

In studies on the electronics sector, Sturgeon (2002) and Sturgeon and Lee (2001)) emphasize the complexity of information exchanged between firms and the degree of asset specificity in production equipment. They highlight three types of supply relationships, based on the degree of standardization of products and processes: (1) the "commodity supplier" that provides standard products through arm's length market relationships, (2) the "captive supplier" that makes nonstandard products using machinery dedicated to the buyer's needs, and (3) the "turn-key supplier" that produces customized products for buyers, and uses flexible machinery to pool capacity for different customers. Along similar lines, but more explicitly stressing governance and power relationships, Humphrey and Schmitz (2002 and 2002a) distinguish between suppliers in quasi-hierarchical relationships tied in a "captive" relationship, and "network" relationships between firms that cooperate because they possess complementary competences.

Gereffi, Humphrey and Schmitz (2004) acknowledge, as do most other frameworks that seek to explain industry organization (such as, e.g. transactions costs, global commodity chains, organizational theory) that market-based relationships among firms and vertically integrated firms (hierarchies) make up opposite ends of a spectrum of explicit coordination, and that network relationships comprise an intermediate mode of value chain governance. They identify three key determinants of value chain governance patterns: the complexity of information and knowledge transfer required to sustain a particular transaction, especially with respect to product and process specifications; the extent to which this information and knowledge can be codified and,

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<sup>2</sup> Gereffi and Memodovic 2003, Giuliani, Pietrobelli and Rabellotti, 2005, Humphrey and Schmitz, 2002 and 2002a, Kaplinsky, 2000, Schmitz and Knorringer, 1999;

<sup>3</sup> In the case of product definition, the buyer can provide different levels of specification. It can set a design problem for the producer, which the producer then solves by providing its technology and design. The buyer might provide a particular design for the producer to work on, or the buyer might even provide detailed drawings for the producer. Buyers can also specify process parameters. Once again, these can be specified at different levels of detail. In some cases, the buyer may merely refer to the process standards to be attained. In other cases, the buyer will specify precisely how particular standards should be attained by requiring and perhaps helping to introduce particular production processes, monitoring procedures, etc. (Sturgeon, 2002)

therefore, transmitted efficiently and without transaction-specific investment between the parties to the transaction; the capabilities of actual and potential suppliers in relation to the requirements of the transaction.

The concept of governance in the GVC literature is mostly dynamic. Humphrey and Schmitz (2002a) underline three factors which may determine a governance change: a) power relationships may evolve when existing producers, or their spin-offs, acquire new capabilities; b) establishing and maintaining quasi-hierarchical governance is costly for the lead firm and leads to inflexibility because of transaction specific investments and c) firms and clusters often do not operate only in one chain but rather simultaneously in several types of chains, therefore they may apply competencies learned in one chain to supply other chains.

Although the final aim of most of these studies is to understand the reason and determinants of performance within value chains, the link between enterprise *upgrading* and GVC governance has been made explicit only recently. In a GVC context, upgrading is defined as innovating to increase value added (Giuliani, et, al., 2005, Pietrobelli and Rabellotti 2006). Enterprises may achieve this in various ways, as for example by entering higher unit value market niches, by entering new sectors, or by undertaking new productive (or service) functions, and always deepening technological capabilities.<sup>4</sup> In addition, within this context innovation is clearly not defined only as a breakthrough into a product or a process that is new to the world. It is rather a story of marginal, evolutionary improvements of products and processes that are new to the firm and that allow it to keep up with an international (moving) standard.

The GVC perspective is useful for various reasons: first because the focus moves from manufacturing only to the other activities involved in the supply of goods and services, including distribution and marketing. These activities account for increasing shares of GDP worldwide. A second new and merit worthy perspective is that GVC emphasizes the nature of the relationships among the various actors involved in the chain, and their implications for development. Moving beyond firm-specific analysis and concentrating on inter-firm linkages, it allows for an easy uncovering of the dynamic flow of economic and organizational activities between producers within different sectors even on a global scale. For example even informal sector scrap metal collectors in South Africa are inextricably linked to a global export trade. They bring scrap metal in old trolleys directly to shipping agents who pay them London spot prices and transfer the scrap immediately to ships for export to iron and steel furnaces across the globe (Kaplinsky and Morris 2001). Furthermore the notion of organizational inter-

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<sup>4</sup> On the relationship between Technological Capability building and global value chains see Morrison et al., 2006.

linkages underpinning value chain analysis may make it easy to analyze the inter-relationship between formal and informal work, with workers, particularly in developing countries, moving often seamlessly from one to the other, rather than viewing them as disconnected spheres of activity. Finally, by focusing on all links and phases in the chain (not just on production) and on all activities in each link, it helps identify which activities are subject to increasing returns in markets characterized by imperfect competition and segmentation.

Addressing these issues however is not straightforward. From an analytical point of view, it implies the study of activities taking place outside firms, and in particular to understand the strategic role of the relationships with key external actors. Most of this literature is still based on case-studies and a systematic empirical methodology is lacking. Reliance only on case-studies has the privilege to capture country specificities and details, but its results are hard to generalize and do not lend themselves to easy and relevant comparisons.

### **3 Governance Patterns of Thai Firms**

#### *Why Thailand?*

Asian countries offer some of the most interesting case studies for value chains' analysis. Thailand represents an attractive case of study in this context, due to the significant increase in value chain networks, and the important challenges the country is presently facing. Thus, several studies have provided evidence that Thailand is "technologically challenged" (The World Bank, 2005) and therefore needs to move beyond its traditional role in GVC as a low-cost manufacturing location. Furthermore, throughout the past decades, especially since 1986, Thailand has experienced a rapid increase in merchandise exports, growing from around one fifth of GDP in the early 1980s to almost two thirds today.

The rapid export growth has also been accompanied by rapid growth in private investment, both local and foreign. Indeed, Thailand has been one of the major FDI recipients in South-East Asia over the past two decades (Brimble and Sherman, 1999; Mephokee, 2002). In 2004, the Global Investment Prospects Assessment (GIPA) of UNCTAD (United Nations Conference on Trade and Development) designed to analyze "future patterns of FDI flows at global, regional, national, and industry levels", ranked Thailand as one of the four "top hot spots for FDI" in the world over the next four years, preceded only by China, India, and the United States.

#### *Data*

The data come from the “Productivity and the Investment Climate Private Enterprise Survey” (PICS), conducted by the World Bank on a representative (stratified) sample of 1,385 Thai firms from 2001 to 2003.<sup>5</sup> For each firm the information is plant-based. The survey focuses on manufacturing firms (sectors 15–36 in the International Industry Standard Classification, ISIC). The industries considered are: Food Processing, Textile and Clothing, Wooden Furniture and Product, Auto parts, Electronics, Rubber and Plastic, Machinery and Equipment. Finally, the database contains comparable qualitative and quantitative information on foreign ownership, sales, technology, value chains, workforce education, exports and productivity.

We define MNCs’ value chains as the relationships occurring between multinationals and Thai firms which sell most of their products to them, but are not owned by the MNC. Then, in order to exploit the information in the PICS database, we broke down the sample distinguishing between Thai firms serving only the domestic market (DOM), Thai firms which are large suppliers of multinationals but are not foreign owned (MNS) and Thai firms that export more than a threshold value of 5% of their output abroad but are not suppliers of MNCs (EXP) and not foreign owned. To avoid ambiguity in the analysis, we do not consider firms with more than 50 percent of equity owned by foreigners,<sup>6</sup> (13 percent of firms in the sample). Therefore, we use a reduced sample of 1,197 Thai firms in the analysis, of which about 49 percent meets the definition of MNS, 14 percent that of EXP and 35 percent DOM.

*Table 1 – Distribution of groups of firms across industries*

	MNS		DOM		EXP	
	No	%	No	%	No	%
Textiles and Clothing	171	28.64	127	29.95	46	26.14
Food Processing	115	19.26	16	3.77	43	24.43
Machinery	79	13.23	58	13.68	10	5.68
Electronics	36	6.03	36	8.49	10	5.68
Wood	53	8.88	55	12.97	15	8.52
Rubber and Plastics	81	13.57	96	22.64	44	25
Automotive Parts	62	10.39	36	8.49	8	4.55
Total	597	100	424	100	176	100

Source: The World Bank - Private Sector Investment Climate (PICS) survey 2004

<sup>5</sup> We performed various tests to control for missing values, zero sales, zero employment, and observations failing to satisfy other basic error checks.

<sup>6</sup> OECD and UNCTAD use a benchmark of 10% as threshold ownership level. Other benchmarks taken by other researches include Sjöholm (1997) who had a benchmark 15 of equity owned by foreigners, Haddad and Harrison (1993) considered foreign firms as those with at least 5 % equity owned by foreigners, Djankov and Hoekman (1998) had a benchmark of 20%, while Castellani and Zanfei (2002) considered foreign firms as those with at least 50 % equity owned by foreigners.



The distribution of firms is spread fairly equally across industries in our sample. The presence of EXP and MNS is concentrated in industries such as Food processing and Textiles and Clothing, while domestic firms are mainly concentrated in Textiles and Clothing and Rubber and Plastics (Table 1).

*Table 2 – Size and sales of firms in the sample*

	<b>MNS</b>	<b>DOM</b>	<b>EXP</b>
<b>Permanent workers</b>			
median value	197	51	135
mean	432	95	283
<b>Total sales</b>			
average sales (current US\$)	\$11,898,767	\$1,657,910	\$10,478,366

Source: The World Bank - Private Sector Investment Climate (PICS) survey 2004

A comparison of firm size (Table 2), computed in terms of total workers, shows that EXP and MNS are generally larger than domestic market-oriented firms. On the basis of the value of sales, domestic firms sell on average less than one fifth of what MNS and EXP sell. Thus, EXP and MNS appear rather similar according to these statistics.

The next step in our analysis is to define a measure of value chain governance on the basis of selected and available variables. This takes into account different levels and types of buyers' involvement in the suppliers' specification of product and process standards, R&D activities and dissemination of technology. Following the literature, and considering some characteristics of the Thai economy, we choose the following variables:

- percentage of sales made exclusively to (suit) buyer's unique specification (**Cl.spec**);
- whether the buyer provided information on design/quality (product characteristics) (**Prod inf. by client**) and imposed product quality standards (**Client enforcement**);
- whether the buyer engaged the firm in process or product R&D type of activities (**R&D activities**);
- whether the buyer sent employees (personnel exchanges) to disseminate and diffuse new technologies into firms' production facility (**Empl. for tech diff.**).

Table 3 documents some descriptive evidence about these factors. Overall, the degree of buyers' involvement in product definition is high in the sample, but much smaller for R&D and technology dissemination. On average, a larger share of firms which are part of value chains led by MNCs receive specifications of products and design by buyers, and the MNC is also involved in R&D activities and in technology dissemination. DOM firms seem to receive the lowest requirements and product and technology info by

clients, while EXP are in-between. On the contrary, in terms of sales made according to clients' unique specification, EXP reveal the highest value.

*Table 3 – Thai firms' relationships with buyers*

	<b>MNS</b>	<b>DOM</b>	<b>EXP</b>
<b>Cl.spec (mean) (1)</b>	44.40	43.31	51.53
<b>Prod inf. by client (2)</b>	78.97	68.87	75.15
<b>Client enforcement (3)</b>	83.3	72.6	77.05
<b>R&amp;D activities (4)</b>	42.68	31.21	32.6
<b>Empl. for tech diff. (5)</b>	39.79	24.42	28.36

Source: Authors' own computation on The World Bank - PICS 2004 data.

(1) % of sales made exclusively to buyers' unique specification.

(2) Information on design/quality provided by the buyer.

(3) Product quality standards enforced by the buyer.

(4) Engagement of the buyer in process or product R&D type of activities.

(5) Employees from the buyer to work to disseminate and diffuse new technologies into suppliers' production facility.

In order to capture different types of governance, we allow different combinations of the key variables above. It is important to remind that our index does not intend to reflect merely a growing involvement of buyers with their suppliers in all aspects of production, but rather focuses on crucial elements of the buyer-supplier relationship as setting product standards and quality requirements, and disseminating technology.

*Table 4 – Classification of Value Chains' governance*

<b>Types of Value Chains' Governance</b>	<b>% of sales made according to buyers' unique specification</b>	<b>Design/quality and product quality standards</b>	<b>Technology dissemination and process and product R&amp;D</b>
<b>G1</b> - Low requirements	Less than 20%	No	No
<b>G2</b> - Higher requirements	More than 20%	No	No
<b>G3</b> - Higher requirements & DQ	More than 20%	Yes	No
<b>G4</b> - Higher requirements & Tech_RD	More than 20%	No	Yes
<b>G5</b> - Higher requirements & DQ & Tech_RD	More than 20%	Yes	Yes

Our typology identifies five basic types of value chain governance (Table 4). G1 reflect a situation where less than 20 percent of total sales are made according to their clients' unique specification, and suppliers do not receive substantial inputs from buyers; G2 type occurs when the percentage of sales made according to buyer' s specification is higher, but still suppliers do not receive information or involvement from the buyer; G3 type reflects a situation where there is a relevant share of sales made according to the

client's specification and buyers intervene to specify quality and design definition; in G4 a relevant share of sales are made according to the client's specification and buyers are involved in technology dissemination and R&D activities, but without intervening in product design and quality; finally with G5 all forms of buyers' involvement occur.

Before proceeding to the econometric analysis, it is instructive to look at the distribution of governance among the three groups of firms and across different industries. We also computed Chi-squared distribution tests to assess whether differences between MNS, EXP and DOM and across industries were significantly different from zero.

All the governance types vary according to firms' status in a statistically significant way (Table 5). Importantly, firms selling their products to MNCs are more likely to be involved in governance type G5 than firms selling to other buyers, both global and domestic. This means that MNCs get engaged in their suppliers' R&D and send their experts to work to disseminate and diffuse new technologies more often than do other buyers. In contrast G3 is more frequent for firms which sell only to the domestic market, and for those which export through other channels.

*Table 5 – Distribution of governance across Thai firms and industries*

<b>Governance by firms</b>					
	G1	G2	G3	G4	G5
MNS	8.5	8.9	29.9	11.1	<b>41.2</b>
DOM	15.4	13.5	<b>31.7</b>	12.1	26.5
EXP	7.0	17.1	<b>35.5</b>	9.2	31.1
<i>Pearson chi2=</i>	45.058	32.408	6.810	3.799	66.862
<i>Pr=</i>	0.000	0.000	0.033	0.15	0.000
<b>Governance by industries</b>					
	G1	G2	G3	G4	G5
Textile and Clothing	9.0	9.0	<b>39.6</b>	8.5	33.9
Food Processing	10.6	12.9	21.8	17.9	<b>36.9</b>
Machinery	11.3	13.0	27.1	13.0	<b>35.0</b>
Electronics	10.8	8.4	24.7	7.2	<b>46.4</b>
Wood	15.2	14.4	<b>34.4</b>	7.2	28.0
Rubber and Plastics	9.6	20.1	21.8	12.1	<b>35.6</b>
Automotive Parts	7.6	8.3	32.4	16.6	<b>34.5</b>
<i>Pearson chi2=</i>	16.2409	66.204	100.4292	59.1907	36.6493
<i>Pr=</i>	0.000	0.000	0.000	0.000	0.000

Source: authors' own computation.

The distribution across industries mostly reflects this picture, with higher concentration in both types G3 and G5. However, some industrial specificity emerges, for example with electronics VCs mainly following a G5 governance, or wood and textiles/clothing with less encompassing forms of governance. What is remarkable and perhaps unexpected is that Value Chains with forms of governance G1 and G2 do not occur frequently, and not even in firms selling only to the domestic market.

This appears to confirm the widespread and growing evidence of various sorts of networks and forms of intense coordination among firms, with stand-alone strategies hardly occurring. Firms are always embedded into multiple linkages, and these linkages appear to be taking forms of increasing complexity.

However, we need to go back to the main question of this paper: after showing, with quantitative evidence, that governance forms vary across GVCs, how does this matter for local firms' efficiency and performance?

#### 4. Governance and Productivity

We explore here the relationship between firms' productivity and governance, focusing on the three groups of firms above, namely MNS, EXP and DOM. As a performance measure we employ total factor productivity (TFP). This measure is typically considered as a growth rate and consists of the wedge between the average growth of outputs and the corresponding average growth of inputs (Barba Navaretti et al. 2003). Moreover, this estimation technique has become increasingly popular in recent studies on FDI (e.g. Javorcik 2004, Blalock and Gertler 2004, Schoors and van der Tol 2002) setting the standard for the current literature.<sup>7</sup>

Our measure of TFP is defined as the residual of a Cobb-Douglas production function. In order to take into account the problem of potential correlation between input levels and the unobserved firm-specific productivity shocks in the estimation of production coefficients, we carry out a panel data analysis using a semi parametric technique to estimate TFP. The estimator used is that proposed by Levinsohn and Petrin (2003) with intermediate input use serving as a proxy for productivity shocks.<sup>8</sup> More specifically, we utilize the information on the amount of electricity consumed by each plant. As electricity cannot be stored, its consumption is likely to follow changes in production activity more closely than the use of materials.

The production function considered is the following:

$$Y_{it} = \delta_1 l_{it} + \delta_2 k_{it} + \delta_3 m_{it} + \omega_{it} + \varepsilon_{it} \quad (1.1)$$

where  $m_{it}$  is the intermediate input (electricity). The error term has two components, the transmitted productivity component  $\omega_{it}$  (or the state variable), and an error term

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<sup>7</sup> Other authors use "upgrading" as a multidimensional measure of performance to encompass not only productivity improvements but also product improvements and firms' growing involvement in new functions and sectors (Giuliani et al., 2005, Humphrey and Schmitz, 2002, Kaplinsky, 2000). Regrettably, this was not possible with the presently available dataset.

<sup>8</sup> Olley and Pakes (1996) develop an estimator that uses investments as a proxy for unobservable shocks. Levinsohn and Petrin (2003) suggest that investments are subjects to adjustment costs, thus not smoothly responding to productivity shocks.

which is uncorrelated with input choices  $\epsilon_{it}$ . The state variable is not observed by the econometrician and affects firms' choice of inputs, potentially leading to the simultaneity problem in production function estimation, first mentioned by Marschak and Andrews (1944).

Thus, we construct our TFP measure as:

$$\hat{w} = \exp(y - \hat{\beta}l - \hat{\beta}k - \hat{\beta}m) \quad (1.2)$$

A comparison of our TFP estimates between the three groups reveals important exporter premia in terms of productivity (average value 5.4, not reported here); MNS show quite similar values (average value 5.2), while DOM firms have lower values (average value 4.6)

We then test the relationship between governance and firms' efficiency through the following specification, and using G1 as baseline category:

$$TFP_i = \delta_0 + \delta_1 G2 + \delta_2 G3 + \delta_3 G4 + \delta_4 G5 + X + e_i \quad (1.3)$$

where  $X$  captures firms' specific characteristics, including size, region and industry. We estimate two different specifications of the above equation: first, with our entire sample, then with the three sub samples of firms.

As for similar research (e.g. "learning by exporting" literature), however, we are aware of the difficulties to define the direction of causality between buyer-supplier relationships and suppliers' performance. More precisely, do such relationships cause suppliers' performance improvements or rather buyers select more efficient firms as their suppliers? Unluckily, the limited number of years for which data are available cannot help us to establish the direction of causality with sufficient confidence in this paper.

Results for the whole sample suggest a significant and positive relationship between firms' productivity and governance G3 and G5 (Table 6). Higher share of sales made to client's unique specification jointly with the involvement of the buyers in design and quality and in technology reveals important premia in terms of productivity compared to type G1. This confirms the qualitative results obtained by other authors (Schmitz, 2004, Giuliani et al., 2005), although the new and different econometric tests make comparisons difficult.

In a second specification of our model, documented in the last three columns of table 6, we repeat the estimation separately for each group using interaction terms. Restricting our attention to these sub-samples enables us to investigate the role played by different buyers. The results from this specification are qualitatively dissimilar from the previous ones and deserve careful interpretation. The emerging picture reveals that the way the value chain is organized is very relevant for DOM firms, while it does not appear to

matter for firms supplying multinational buyers (MNS), or for EXP. DOM firms with high customization of products to buyers' standards, that also receive assistance on design & quality definition and R&D and technology dissemination (G5) are more productive than the others. The mode of governance of their value chains is positively related to their productivity.

Can we interpret these results to suggest that firms participating in domestic VCs rely on a greater involvement of the chain leader to foster their process of learning and efficiency improvement? As seen above, EXP and MNS have relatively higher level of TFP than DOM. Once again the problem of causality forces us to interpret these results very cautiously. On the one hand, MNCs may select their suppliers among the most efficient firms (i.e. "picking the best cherries") – and indeed our data reveal that firms which are suppliers of multinationals are more efficient than DOM firms. We may explain this for example by observing that firms are often forced to improve their efficiency before starting the relationship with the MNCs in order to qualify as MNCs' suppliers. In this case the form of governance of the VC would not matter for them initially, and we would need longer time series to test for the existence of possible dynamic learning processes.

The same line of reasoning may apply to firms serving other foreign buyers (EXP), in agreement with the literature on "learning by exporting"<sup>9</sup>: efficient and above average performers firms are likely to be the ones that are able to cope with sunk costs, and exporters have most of the desirable performance characteristics several years before they enter the export market.

On the other hand, if the self-selection hypothesis were not confirmed, the test of the existence of a learning process would require longer (dynamic) observations. Another possible explanation of these results that may deserve future testing might be due to the different nature of the information and knowledge exchanged within global and within domestic chains. Insofar the gap of competencies between multinationals and their suppliers is smaller in GVCs, it is easier to have cooperative relationships. In contrast, hierarchy is more likely to occur in national chains due to the suppliers' poor level of skills and competencies.

As a robustness check of the results, we use an alternative measure of firms' performance: the net value added per worker. Value added is defined as sales minus intermediate input purchases. In table 7 we report results from regressing the governance types on the log of net value added per worker. These findings are generally

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<sup>9</sup> Clerides, Lach, and Tybout, 1998; Bernard and Jensen, 1997, 1999, 2001; Aw et al., 2000; Kraay, 1999; Blalock and Gertler, 2003. For a review see Wagner 2006.

consistent with the picture we obtained from regressions based on TFP measure, except for G3. Looking at the whole sample, we find that only G5 matters for firms' performance, meaning that only firms receiving assistance on design & quality definition and R&D and technology dissemination are more productive than the others.

*Table 6 – Firms' TFP and Value chains' governance*

<i>Dependent Variable: log of TFP</i>				
	ALL FIRMS	MNS	DOM	EXP
G2	0.21 -1.54	-0.002 -0.01	0.32 (2.38)*	-0.126 -0.33
G3	0.343 (2.59)**	-0.139 -0.48	0.693 (3.79)**	0.007 -0.02
G4	0.101 -0.76	-0.264 -0.87	0.301 (2.04)*	0.194 -0.48
G5	0.389 (2.80)**	-0.07 -0.22	0.668 (3.18)**	0.52 -0.98
Size dummies	included	included	included	included
Industry dummies	included	included	included	included
Region dummies	included	included	included	included
Year dummies	included	included	included	included
Constant	4.578 (22.08)**	4.621 (11.54)**	4.367 (11.61)**	4.146 (9.69)**
Observations	4022	4022	4022	4022
R-squared	0.17	0.11	0.15	0.12

Robust t statistics in parentheses. \* significant at 5%; \*\* significant at 1%

Source: authors' calculation on PICS 2004 data - The World Bank.

Results for the three sub samples reveal again that governance seems to be very relevant for DOM firms, but not for MNS and EXP, in accordance with the results obtained with TFP.

*Table 7 – Firms' Value Added and Value chains' governance*

<i>Dependent Variable: log of Value Added per worker</i>				
	ALL FIRMS	MNS	DOM	EXP
G2	-0.04 -0.43	-0.26 -1.45	0.28 (2.27)*	0.35 1.47
G3	-0.02 -0.22	-0.08 -0.59	0.25 (2.35)**	-0.13 -0.56
G4	0.04 0.43	0.10 0.61	0.08 (0.55)*	-0.45 -1.22
G5	0.19 (2.38)**	0.14 1.09	0.42 (3.82)**	-0.07 -0.28
Size dummies	included	included	included	included
Industry dummies	included	included	included	included
Region dummies	included	included	included	included
Year dummies	included	included	included	included
Constant	4.578 (22.08)**	4.621 (11.54)**	4.367 (11.61)**	4.146 (9.69)**

Observations	4022	4022	4022	4022
R-squared	0.55	0.43	0.48	54

Robust t statistics in parentheses. \* significant at 5%; \*\* significant at 1%

Source: authors' calculation on PICS 2004 data - The World Bank.

## 5 Conclusions

In this paper we have explored the patterns of governance arising in value chains led by Global Buyers and their impact on suppliers' performance with specific reference to the Thai manufacturing industry.

In order to address this issue, we have developed a quantitative measure of GVC governance, which takes into account different levels and types of buyers' involvement in the suppliers' specification of product and process standards, R&D activities and dissemination of technology. Our typology identifies five basic types of value chain governance. We applied this typology to Thailand and compared the governance patterns and suppliers' performance of GVCs led by MNCs, of domestic value chains, and of firms exporting through other channels.

An important finding is that the relationships MNCs have with their suppliers is multifold, and as they get engaged in their suppliers' process or product R&D and send their experts to work to disseminate and diffuse new technologies more often than other buyers. In contrast, firms which are part of domestic value chains and those that sell to other global buyers prove to follow modes of governance that imply only involvement in defining design and products' characteristics.

How do these different modes of governance impact on local firms' efficiency and performance? Our estimates show that more intense buyers' involvement with local suppliers, not only in the definition of products' characteristics, design and quality, but also in technology dissemination and R&D is associated with higher productivity.

As we focus our attention to the three sub-samples of firms, we find that the way the value chain is organized is very relevant for domestic-led value chains, and affects these firms' productivity. In turn, the mode of governance does not appear to matter for firms supplying MNCs or for exporters. High customization of products to national buyers' standards, coupled with assistance on design & quality definition and technology dissemination is associated with higher local firms' productivity. We suggest that this apparent paradox may be explained as a consequence of the different nature of the information and knowledge being exchanged, and of the gaps between the leader and its suppliers.



## References

- Aitken, B. and Harrison A.E. (1999). "Do Domestic Firms Benefit from Direct Foreign Investment?" *American Economic Review* 89: 605- 18.
- Albio, V., Garavelli, A.C. and Schiuma, G. (1999) 'Knowledge Transfer and Inter-firm Relationships in Industrial Districts: the Role of the Leader Firm', *Technovation* 19: 53-63.
- Archibugi D., and Pietrobelli C. (2003), "The Globalisation of Technology and its Implications for Developing Countries. Windows of Opportunity or Further Burden?", *Technological Forecasting and Social Change*, Vol.70, pp.861-83.
- Barba Navaretti, Giorgio and Castellani, Davide (2004), "Investments Abroad and Performance at Home: Evidence from Italian Multinationals". CEPR Discussion Paper No. 4284.
- Blalock, G. and Gertler P. (2002). "Technology Diffusion from Foreign Direct Investment through Supply Chain," Working Paper, Cornell University.
- Brimbie, P. and Sherman, J., (1999). *Mergers and acquisitions in Thailand: The changing face of foreign direct investment*. Paper prepared for the United Nations Conference on Trade and Development (UNCTAD).
- Castellani D., Zanfei A. (2002) "Multinational experience and the creation of linkages with local firms. Evidence from the electronics industry", *Cambridge Journal of Economics*, Vol. 26, N. 1, pp. 1-15.
- Castellani, D., and Zanfei, A., (2006). *Multinationals, Innovation and Productivity. Evidence from Italian Manufacturing Firms*. Cheltenham, UK, Northampton, MA, USA: Elgar.
- Dunning J. H. (1993) *Multinational Enterprises and the Global Economy*, Addison- Welsley, Wokingham.
- Gereffi, G. (1994) 'The organization of buyer-driven global commodity chains: how U.S. retailers shape overseas production networks', in G. Gereffi and M. Korzeniewicz (eds) *Commodity Chains and Global Capitalism*, Westport: Praeger, pp. 95--122.
- Gereffi, G. (1999) 'International trade and industrial upgrading in the apparel commodity chain', *Journal of International Economics* 48: 37--70.
- Gereffi, G. and Memodovic, O. (2003) 'The global apparel value chain: what prospects for upgrading by developing countries?' *United Nations Industrial Development Organization (UNIDO), Sectoral Studies Series*, [www.unido.org/doc/12218](http://www.unido.org/doc/12218).
- Giuliani E., Pietrobelli C., Rabellotti R., 2005, Upgrading In Global Value Chains: Lessons From Latin American Clusters, *World Development*, Vol.33(4), 2005, pp. 54973.
- Giuliani E., Rabellotti R. and van Dijk M.P. (eds.) (2005). *Clusters Facing Competition: The Importance of External Linkages*, Aldershot: Ashgate.
- Helpman, E., Meliz, M., and Yeaple, S., (2004). "Export versus FDI with Heterogeneous Firms", *American Economic Review*, 94, 1, pp.300-16.
- Hewitt Dundas, N Andreosso-O'Callaghan, B Crone, M Murray, J and Roper, S (2002) 'Learning from the Best - Knowledge Transfers from Multinational Plants in Ireland- A North-South Comparison', NIERC/EAC, Belfast.
- Humphrey, J. and Schmitz, H. (2002) 'How Does insertion in global value chains affect upgrading in industrial clusters?', *Regional Studies* 36 (9): 1017--27.
- Humphrey J., Schmitz H. (2002a). "Developing Country Firms in the World Economy: Governance and Upgrading in Global Value Chains", INEF Report, No. 61, Duisburg: University of Duisburg.
- Javorcik-Smarzynska, B.S. (2004). "Does Foreign Direct Investment Increase the Productivity of Domestic Firms? In Search of Spillovers Through Backward." *American Economic Review* 94, 605-627.

- Kaplinsky, R. (2000), "Spreading the gains from globalisation: what can be learned from value chain analysis?". IDS working paper 110
- Kaplinsky, R. and M. Morris (2001), A Handbook for Value Chain Research, <http://www.ids.ac.uk/ids/global/valchn.html#manuals>.
- Kaplinsky, R. (2001), "Learning Networks in the South African Auto Components Industry", *Innovation News*.
- Lall, S. (1980). "Vertical Inter-Firm Linkages in LDCs: An Empirical Study." *Oxford Bulletin of Economics and Statistics* 42, 203-206.
- Levinsohn, J. and Petrin A. (2003). Estimating Production Functions Using Inputs to Control for Unobservables *Review of Economic Studies* v70, n2: 317-41.
- Markusen J.R., (1995), "The Boundaries of Multinational Enterprises and The Theory of International Trade", *Journal of Economic Perspectives*, Vol.9 No.2, Spring, pp.169-89.
- Morrison A., Pietrobelli C., Rabellotti R.. (2006). Global Value Chains and Technological Capabilities: A Framework to Study Industrial Innovation in Developing Countries. Mimeographed, CREI, University of Rome 3.
- Oman C. (1984), New Forms of International Investment in Developing Countries (Paris: OECD).
- Pietrobelli C. and Rabellotti R., forthcoming (2006), Upgrading and Governance in Clusters and Value Chains in Latin America, Cambridge, Ma.: *Harvard University Press*.
- Rodriguez-Clare, Andre (1996). "Multinationals, Linkages, and Economic Development," *American Economic Review* 86, 852-873.
- Saggi, Kamal (2002). "Trade, Foreign Direct Investment, and International Technology Transfer: A Survey," *World Bank Research Observer* 17, 191-235.
- Schmitz H. (1999a). "Increasing returns and collective efficiency", *Cambridge Journal of Economics*, Vol. 23, No. 4: 465-483.
- Schmitz H. (1999b), "Global competition and local co-operation: success and failure in the Sinos Valley, Brazil", *World Development*, Vol. 27, N°9.
- Sturgeon, T. and Lee, J.-R. (2001) 'Industry Co-Evolution and the Rise of a Shared Supply-Base for Electronics Manufacturing', *Paper Presented at Nelson and Winter Conference*, Aalborg, June.
- Sturgeon, T. (2002) 'Modular production networks: a new American model of industrial organization', *Industrial and Corporate Change* 11 (3): 451--496.
- Sturgeon, T. and Lester, R. (2004) "The new global supply-base: challenges for local suppliers in East Asia." in S. Yusuf, A. Altaf and K. Nabeshima (eds.) *Global Production Networking and Technological Change in East Asia*, New York: Oxford University Press.
- Turok, I. (1993) 'Inward Investment and Local Linkages: How Deeply Embedded is "Silicon Glen"?', *Regional Studies* 27: 401-417 .
- Zanfei, A. (2000) "Transnational firms and the changing organisation of innovative activities", *Cambridge Journal of Economics*, Vol. 24, pp. 515-42.